REMARKS

Applicant thanks the Examiner for his review of Applicant's response to the prior Office Action (mailed May 7, 2001).

This amendment is in response to the non-final Office Action mailed July 29, 2002 (herein referred to as the "Office Action").

Claims 11-19 are in the application. In the Office Action, the Examiner:

- o Acknowledged receipt and review of certain references that had been cited but had been missing from the file, and made said references of record.

- o Maintained the prior rejection of claims 11-15 under 35 U.S.C. Section 102 (b), based on a suggestion in an article in Sloan Management Review of Winter 1995 by Richard Pawson, et al. ("Pawson") that Applicant's "KAPITAL" system performed "portfolio analysis."

- o Maintained the prior rejection of claims 11-19 under 35 U.S.C. Section 103 (a) over Kleckner et al, WO94120912 ("Kleckner") in view of Rasala, "A model C++ tree iterator class for binary search trees", in 28th SIGCSE Technical Symposium on Computer Science Education in March 1997 ("Rasala").

- o Maintained the prior rejection of claims 16-19 under 35 U.S.C. Section 103 (a) over Kleckner and Rasala as applied to claim 11, further in view of Gould, "Double Dispatch with an Inverted Visitor Pattern," in the May 1998 edition of C/C++ Users Journal ("Gould").

Summary of Response. In response to the Office Action, Applicant:

- o Adds a sentence to page 43 of the specification to conform to original claim language.

- o Cancels claims 11-16.

- o Amends claim 17 and 18.

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- o Adds new claim 20, which is a combination claim based on subject matter previously claimed in the application.
- o Submits a further Information Disclosure Statement citing information from Applicant's files.
- o Submits the declaration of its Vice President, Mr. Jerrold Cohen, explaining the reasons for canceling claims and the bases for the new claims submitted herewith.

Detailed Remarks

Application Assigned. It is pointed out that an assignment of the present application is of record, in favor of J.P. Morgan & Co., Inc., now known J.P. Morgan Chase & Co. (the "Company"), which controls the prosecution thereof. The inventors have taken other employment and no longer work for the Company.

Amendment of Specification. The sentence added to the specification at p. 43, line 6 does not constitute new matter because the subject matter thereof was contained in the original claims as filed with the application (specifically, original claim 14). The sentence is added to conform the specification with the claims.

Cancellation of Claims. In the Office Action, the Examiner maintained the rejection of claims 11-15 on the basis of public use under 35 U.S.C. Section 102 (b). The Examiner cited a disclosure in the 1995 Pawson article regarding "portfolio analysis" performed by a system in use by Applicant at or about the time of the article.

As explained in the accompanying declaration of Jerrold Cohen, the Pawson article itself did not disclose or suggest the subject matter claimed in claims 11-15 (or any of the other claims originally in this application). However, in response to the Examiner's request, Applicant made a thorough effort to ascertain the history of Applicant's introduction of various processing techniques in successive generations of software for handling financial derivative products that were in use at Applicant's facilities.

Applicant has had an evolving series of systems, under the name "Kapital," for managing Applicant's portfolio of derivative financial instruments. The Kapital project dates from the early 1990s. The present invention concerns an object model, internally called "BOMIOM," that was introduced in the late 1990s and which became the object model used within Kapital for representing and processing financial instruments, replacing models that had been used earlier.

The present application, originally filed on July 31, 1998, was filed within 12 months of the time that the BOMIOM object model became a part of the commercial deployment of the Kapital System. This was well after the Pawson article.

However, the Examiner's question related to whether the actual commercial implementation of Kapital as referenced in the Pawson article utilized features such as those claimed in the present application.

Since both of the inventors had been gone from the employ of Applicant for some time, Applicant asked another employee, its Vice President, Jerrold Cohen, to look into the questions regarding "public use" that had been raised by the Examiner. Mr. Cohen is currently involved in application development for the Kapital Project, and joined that project after the critical date. He is not an inventor of any of the claimed subject matter.

Mr. Cohen's investigation produced information in the form of an unpublished December 1993 paper entitled "The Kapital Object Model" (herein referred.to as the "1993 Paper"). Applicant believes the 1993 Paper substantially reflects the object model employed in the Kapital system used by Applicant during that time period, as later referenced in Pawson.

Applicant wishes to make clear that since the 1993 Paper was never published, it is not being presented as a "printed publication" under Section 102 (b), but rather as evidence – the best evidence Applicant has been able to find – of the relevant portions of the version of the Kapital system that was used by Applicant prior to the critical date (i.e., the 1993 Paper is "other information" rather than a "publication" for purposes of 37 C.F.R. 1.98 (a) (1) and the accompanying IDS).

The system described in the 1993 Paper represented financial instruments as objects and "related classes" (see 1993 Paper at p. 2). The class corresponding to trades and financial instruments that were externally visible was called "JPPublicFinancialObject." The internal representation of these trades and instruments was reflected in objects derived from the class "JPPrivateFinancialObject" (1993 Paper, p. 3). The latter included "stream data" – internal deal information for structures which have more than one "value event" associated with them (1993 Paper, p. 4). The "related classes" included "event" classes which were related to, but not derived from, the financial object classes. There were also separate classes that described the "financial environment" and the available "curves" that could be used to perform calculations.

In addition, there were "Calculator objects" that performed processing, such as pricing ("Pricer objects"), on the financial instrument objects (see 1993 Paper, p. 34).

In order to use a Pricer object, it was necessary to specify a number of parameters, including (1) the financial object to be priced, (2) the financial environment, and (3) the "curves" to use (1993 Paper, pp. 34-35).

It is significant that in order to facilitate this processing, there was a special class in Kapital called "JPPricerHandler" which maintained a dictionary of all public financial object classes together with the name of the pricer which would best be able to value this object (p. 35, sec. 7.2.1).

The system described in the 1993 Paper differs from BOMIOM in that (among other things) (a) there is no "specification language" described in the 1993 Paper for creating and representing the instruments, (b) there is no "macro structure" generated, as in BOMIOM, as a separate part of the instrument, (c) there is no specific teaching that the processing object "traverses" the macro structure, (d) the 1993 Paper does not teach eliminating dependencies between the operations performed to process one financial event from those used to process the others, and (e) whereas in the 1993 Paper the Pricer object has to be selected to best match the type of instrument it is processing, in BOMIOM this is not necessary, and in fact there is a

requirement that the processing object have no predetermined knowledge of the overall referential financial event structure of the financial instrument being processed.

Despite these significant differences, Applicant is canceling claim 11 herewith because Applicant believes it is sufficiently clear that the "Pricer objects" in the 1993 Paper could access all of the relevant data that it needed from the financial instrument object in order to perform the desired calculation, through a process that might be considered "traversal." (See note below regarding the reasons for claim cancellation.)

Applicant further believes that there is also sufficient basis, given the cancellation of claim 11, to cancel claims 12-16 as well, on the basis of the Kapital system used by Applicant prior to the present invention, in light of prior art references such as the Gamma, et. al. (citation no. 2 in Applicant's IDS), as well as Gould (cited by the Examiner). (Refer again to note below regarding the reasons for claim cancellation.)

Applicant believes, however, that claims 17-19 as hereby amended present patentable subject matter, as will be discussed below. In addition, Applicant presents a new claim herewith (claim 20) based on a combination of certain subject matter previously presented.

Amended and New Claims

Claims 17-19

Applicant has now amended claim 17 as shown above (and in marked form on the accompanying paper) so as to present that claim in independent form (incorporating the limitations of canceled claims 11-16), with some wording changes for purposes of clarification.

Claim 18, as set out in full above, has been amended so as to depend from claim 17 but otherwise has not been changed. The dependent portion of claim 19 has not been amended, but the base claim of that claim (claim 18) has been amended as noted in the preceding sentence. (Applicant notes, for the convenience of the Examiner, that claim 19 states: "The system of claim 18 wherein said nested double dispatch mechanism can be applied recursively to any level.")

Claim 17 as amended incorporates two distinct elements specifically related to "valuation independence" – i.e., (i) the element whereby "the action to be performed for each type of financial event is defined, in said traversal process, independently from the action for any other type of financial event, and (ii) the element whereby "the double dispatch mechanism of said traversal process selects the appropriate action for each financial event without predetermined knowledge of the overall referential structure of said macro structure." For convenience of reference, these two elements are sometimes referred to herein as the "independence elements" (or "valuation independence elements") of claim 17.

Applicant submits that the independence elements of claim 17 particularly distinguish the present invention from object oriented financial systems that went before, such as the version of Kapital described in the 1993 Paper and referenced in the Pawson article, and systems used by others, such as Kleckner, WO 94/20912, cited by the Examiner. While Applicant also introduced "double dispatch" as an element of processing in the present invention, and the element of "double dispatch" is recited in claim 17, it was "valuation independence" (as incorporated into claim 17 by way of its "independence elements" referenced above) that had to be built into the system in order for double dispatch to be useful.

The concept of "valuation independence" is described at length in the specification. For example, in the Summary of the Invention it is stated:

"To accomplish these and other objectives of the invention, we have developed a system that employs valuation independent, well-defined financial components (also referred to as financial events) that can be combined to build new financial structures. 'Valuation independent' means that financial instruments are modeled independently of their valuation methodologies." (Specification, p. 4, lines 1-5.)

"[T]he essential concept that underlies all of our work in this area is that financial products can and should be modeled independently of their valuation methodologies." (Specification, p. 7, lines 3-5.)

The specification teaches two manifestations of "valuation independence," both of which are recited in amended claim 17: (i) the ability to select any desired processing method on a given representation of an instrument without having to change the instrument's representation, and (ii) the fact that the processor has no predetermined knowledge of the relationships between the financial events it is processing.

Regarding the first of these types of independence, the specification teaches the following:

Specification, p. 7, lines 17-20: "It should be possible to use *any* of these valuation models [citing as examples for evaluating an option, the Black & Scholes, probabilistic tree or Monte Carlo simulation models] on the exact same representation of the equity option. To accomplish this we require that the product model and valuation methodologies be independent of one another."

Specification, p. 8, lines 23-25: "The interface [by which one financial event within an instrument points to another] must also be 'processor independent'. This means that it returns results that will not change depending on the kind of processing taking place."

Specification, p. 10, lines 3-5 and 20-23: "In this model the software structure of any financial instrument is factored into distinct portions. . . . This process always creates exactly the same events for a given combination of instrument specification and instrument parameters."

Regarding the second of these types of independence, the specification teaches the following:

Specification, page 11, lines 2-4: "[P]rocessing is independent from the framework for definition of financial instruments. The term "processing" is used to cover any and all operations that can be applied to a financial instrument and its events."

Specification, page 43, lines 5-8 (as hereby amended): "For each specific type of financial event, a processor can only rely on the micro structure of that event. The action to be performed for each type of financial event is defined, in the processor, independently from the action for any other type of financial event. It cannot assume a specific type for any nested

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financial event, only that the nested events adhere to the stated interfaces. These interfaces can be used to provide processor independent information about the internally nested events."

Specification, page 46, lines 1-3 (describing the use of double dispatch to determine which processing method is chosen for a given financial event within a given processor): "Once again, the processor has no knowledge of and should make no assumptions on how the event is embedded in the macro structure of the instrument."

Both of these "valuation independence" features, as reflected in the wording of claim 17 as presently amended, have no analogs in the prior art treatment of financial instruments.

As noted above, the 1993 Paper described the use in the then current implementation of the Kapital system of "Pricer objects" that performed some of the functions of the "traversal process" referred to claim 17 as amended. However, the 1993 Paper does not indicate that the Pricer objects in Kapital defined "the action to be performed for each type of financial event . . . independently from the action for any other type of financial event," or that it "selects the appropriate action for each financial event without predetermined knowledge of the overall referential structure of said macro structure." Nor is there any suggestion of how such independence would be implemented, or even that it would be useful. To the contrary, the system described in the 1993 Paper required the financial instrument to look up an appropriate processing function having this knowledge (see p. 35, sec. 7.2.1).

A *prima facie* case of obviousness requires (i) some suggestion or motivation, either in the cited references, or in the knowledge generally available to one of ordinary skill in the art, to modify a cited reference or to combine reference teachings; (ii) a reasonable expectation of success; and (iii) the combined references must teach or suggest all of the claim limitations. MPEP 2143.01. Moreover, if the proposed modification would render the prior art invention being modified unsuitable for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *Id.*

Applicant submits that, for a person of ordinary skill in the art, there would not be a reasonable expectation of success in combining the prior art teaching with regard to double

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dispatch to the Kapital system as it existed prior to the present invention, and furthermore that there was no suggestion or motivation to make the modifications to the prior art that would have been necessary for the combination of the references to have been operable.

Specifically, it would not have been possible simply to engraft a double dispatch processing scheme (or, in other words, a "visitor pattern") on the Kapital system as reflected in the 1993 Paper in order to produce a system equivalent to the present invention. The reason such an approach would not have worked was because to have done this would have required first reworking the object model of the prior Kapital system in order to make it consistently valuation independent. As the specification stated (at p. 7, lines 17-20), to accomplish the objectives of the invention, it was "require[d] that the product model and valuation methodologies be independent of one another."

Applicant submits that it would not have been obvious to those of ordinary skill in the art to have embarked on the reworking of the 1993 Paper's object model that would have been necessary in order for a double dispatch approach to have been operable (i.e., reworking the object model so as to make all components consistently valuation independent). Applicant submits that there was no suggestion in the prior Kapital system or elsewhere in the prior art to fashion a representation of a financial instrument entirely with valuation independent components. Not would it have been obvious to one of ordinary skill in the art (i) to realize that a financial object's representation could be modified in this manner, (ii) to know how to effect such modification, or (iii) to realize the benefits that would result in a manner that would be considered sufficient to justify the effort involved in such a modification. In sum, the teaching of double dispatch is inapplicable to a system such as the Kapital system as it was prior to the present invention, absent a necessary reworking of that system to render the components consistently valuation independent, and such a modification itself would not have been obvious.

Accordingly, there is no reason to believe, based on the 1993 Paper or any other information now available to Applicant, that the Kapital system in use during the timeframe of the 1993 Paper had the characteristics of valuation independence that are incorporated in claims

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17-19 as amended. Applicant therefore submits that the Kapital system as used by Applicant prior to the critical date neither anticipates, nor, in combination with other cited references, renders obvious, claims 17-19 as amended.

With regard to the outstanding rejection under 35 U.S.C. Section 103 (a), the Examiner, in the last Office Action, cited Kleckner at p. 4, line 29, as disclosing "independence."

Applicant responds that the "independence" as disclosed in Kleckner is functionally different than the above-referenced "independence elements" incorporated in claims 17-19 as amended, and therefore Kleckner cannot properly be applied as a reference in combination with other references in order to establish the element of "independence" as used in claims 17-19.

Applicant has set forth at length above what was intended in the specification with regard to the meaning of the two "independence" elements recited in claim 17 as amended (processing action for any one event defined independently from the action for any other type of financial event, and processor having no predetermined knowledge of the overall referential structure of said macro structure).

In Kleckner, a financial instrument was modeled so as to be comprised of "a plurality of interconnected terms." Kleckner, p, 5, lines 2-3. Kleckner stated that in the "term evaluation engine" the "*evaluation is order independent for inputs*" (Kleckner, p. 4, lines 29-30, emphasis added). However, what was "independent" in Kleckner was the order of evaluation of "required term inputs" (see line 28) – not the "terms" themselves. In the present invention, the independence described relates to what corresponds to the "terms" in Kleckner. The mention at p. 4, lines 29-30 of Kleckner is specifically what was cited by the Examiner, and is the only such mention in Kleckner. Kleckner does not teach or suggest maintaining independence of the "terms" that comprise an object representing a financial instrument (as opposed to the inputs to any given term).

Kleckner, in fact, indicates a contrary structure, in which the terms themselves clearly have dependencies from one to the next: "A network of connected terms forms an evaluation network. An input of a term may be connected (via a 'Connect()' function) to the output of any

term . . . provided that the . . . type of the input and output are 'compatible.'" Kleckner, p. 15, lines 4-8. While it may be possible to evaluate a given term's inputs in an arbitrary order, there is no teaching or suggestion in Kleckner that any term may be evaluated in toto independently from the evaluation of any other term, and in fact the opposite appears to be the case. As stated in Kleckner's own summary, the relevant object entities are objects "whose value depends on the value of other objects" (Kleckner, p. 4, lines 23-24).

In the last Office Acton, the Examiner also rejected claim 17 over Kleckner and Rasala in light of Gould, which disclosed double dispatch for use in C++ programming. However, Applicant is not relying on the use of double dispatch to establish the patentability of claim 17, but rather is relying, together with double dispatch, on the two "valuation independence" elements recited in the claim as amended, which elements, as discussed at length above, are themselves novel and nonobvious, and are necessary in order to make double dispatch useful in the processing that is being claimed.

Claim 20

Applicant has added claim 20, as shown above.

Claim 20 contains the subject matter that was formerly in claim 10, but now put in a form dependent from claim 17, and therefore incorporating all of the additional elements of claim 17. In addition, another element, the "processor independent" event-to-event interface within the financial event template, has been inserted in this claim. Antecedent support for this element is found in the specification at p. 8, lines 14-25.

Applicant is not claiming declarative specification languages per se, as such languages as applied to other subject matter were known in the prior art (for example, VHDL for modeling hardware, as described in citation no. 7 in Applicant's previous IDS).

In contrast, claim 20 recites not only the specification language itself, but the use of that language in conjunction with a traversal process for processing instruments having valuation independent components as recited in claim 17.

The feature whereby events may be processed independently from one another is made possible by the use of processor independent interfaces in the financial event template whenever one event references another, as recited in claim 20.

Applicant submits that nothing teaching or suggesting the subject matter of claim 20 may be found either in the Kapital system as reflected in the 1993 Paper, or in any of the prior art cited by the Examiner.

Applicant further submits that claim 20, since it merely combines subject matter previously presented in the claims of this application, does not necessitate further search.

Comment regarding Cancellation of Claims

Applicant wishes to make clear on the record that its prior cancellation of claims 1-10 was for business reasons -- the potential use of the subject matter of claims 1-10 in an industry standard for a "financial instrument markup language" – rather than for reasons of patentability.
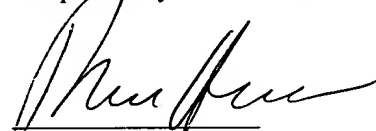
Applicant believes that claim 11 could be distinguished over the 1993 Paper based on the words "generic traversal process" that were in the claim. In other words, Applicant believes that giving proper effect to the word "generic" would result in the conclusion that claim 11 would be patentable. However, Applicant believes that the inventive subject matter of this claim, as well as that of claims 12-16 (which were all dependent from claim 11) can be more clearly expressed by canceling those claims and amending claims 17-19, as has been done herein. Moreover, Applicant states that in any implementation of the claimed system, all of the limitations of what were in claims 11-17 would be incorporated if any of them were. Applicant accordingly states that claims 11-16 were cancelled, and claims 17-19 amended, for purposes of clarification and that the claims as amended do not alter the scope of what was previously claimed given the construction of claim terms that was intended by the Applicant.

CONCLUSION

Once again, the Applicant thanks the Examiner for his attention and insights regarding the present application. The Applicant respectfully requests that the application be reconsidered in light of the present amendments and remarks, and that claims 17-19 as hereby amended and claim 20 as hereby added, be allowed. If the Examiner believes that an interview may help to clarify the present remarks or may help the Examiner to determine that the application is in a condition for allowance, Applicant respectfully requests that the Examiner contact the attorney of record at the phone number listed below.

Dated: January 28, 2003

Respectfully submitted,

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COPY OF CLAIMS WITH MARKINGS TO SHOW CHANGES MADE

1   11. (CANCELED)

1   12. (CANCELED)

1   13. (CANCELED)

1   14. (CANCELED)

1   15. (CANCELED)

1   16. (CANCELED)

1   17. (AMENDED) [The system of claim 16,]A data processing system for financial
2   instruments, comprising representations of one or more financial instruments, said
3   representations of financial instruments having a macro structure containing
4   financial events relative to said instrument, and a generic traversal process
5   implemented via a double dispatch mechanism, wherein said traversal process is
6   applied to said macro structure to implement one or more functions that produce
7   results based on said macro structure, wherein each said function is implemented as
8   a specific extension of said traversal process to generate a specified type of result,
9   wherein each traversal process is based on a well defined interface between the
10   financial events contained in said macro structure and said traversal process,
11   wherein the action to be performed for each type of financial event is defined, in said
12   traversal process, independently from the action for any other type of financial event,
13   and wherein [said]the double dispatch mechanism of said traversal process selects
14   the appropriate action for each financial event without predetermined knowledge of
15   the overall referential structure of [the financial event structure]said macro structure.

1   18. (AMENDED)   The system of claim [16]17, wherein a nested double dispatch
2   mechanism initiated inside the action for a given financial event can select the
3   appropriate action for any financial event referred to locally within the financial
4   event.

1   20. (NEW)   The system of claim 17, wherein said financial instruments are described in
2   a declarative specification language comprising financial event templates, said
3   templates are parameterized to form a static representation of said financial
4   instrument, a processor independent interface is provided for each event in said
5   template that references another event, and wherein said macro structure results
6   from a process within said system that transforms said static representation into a
7   timeline of financial events that constitutes said macro structure, and said processing
8   is performed for each type of financial event independently from the processing
9   performed for any other type of financial event.